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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/955,288	09/19/2001	Joo-Hyong Lee	LGS/S-0030A	9373
34610	7590	03/02/2004	EXAMINER	
FLESHNER & KIM, LLP P.O. BOX 221200 CHANTILLY, VA 20153			DIAZ, JOSE R	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 03/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/955,288

Applicant(s)

LEE, JOO-HYONG

Examiner

José R Díaz

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4, 12-19, 21-24, 26 and 29-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15, 21, 23, 24, 30-32, 34-38 and 40 is/are allowed.
- 6) ☒ Claim(s) 1, 13, 14, 16-19, 22, 29, 33 and 39 is/are rejected.
- 7) ☒ Claim(s) 2-4, 12 and 26 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 09/290,891.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Objections*

Claim 2 is objected to because of the following informalities:

Claim 2 recites the limitation "a second MOS transistor having the second conductivity type and a second contact region having **the second conductivity type** formed in the second well" [emphasis added], please correct the conductivity type of the second contact region by changing "the second conductivity type" to -- the first conductivity type --.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13-14, 16-19, 22, 29 and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 13 and 14 recite the limitation "a second well..." It is not clear whether this second well is a new well region formed in the substrate, in addition to the second well recited in claim 1, or the same well region previously recited in claim 1.

Claim 16 recites the limitation "the first contact region" in line 4. There is insufficient antecedent basis for this limitation in the claim.

Claims 17 and 22 recite the limitation "a heavily doped region of buried layer having a first conductivity type..." It is not clear whether this heavily doped region of buried layer is a new buried layer formed in the substrate, in addition to the heavily doped region of buried layer recited in claim 1, or the same buried layer previously recited in claim 1.

Claims 18-19 are rejected due to their dependency on claim 17.

Claim 29 recites the limitation "the heavily doped region of buried layer" in line 2. There is insufficient antecedent basis for this limitation in the claim. Please note that claim 15 now recites two heavily doped regions of buried layers.

Claim 33, recites the limitation "at least one of the heavily doped regions of buried layer having a first conductivity type and/or second conductivity type..." The use of the clause "and/or" makes the claim confusing since it is not clear whether each buried layer has only one conductivity type (e.g. first or second conductivity type) or both (e.g. first and second conductivity types).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art in view of Tsukikawa (JP 05-129558).

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Regarding claims 1 and 39, Applicant acknowledges a semiconductor device comprising: a semiconductor substrate (11) having a first conductivity type (can be P- or N- type, however for purpose of this rejection consider P-type as the first conductivity type) (see fig. 1); a first well (21) having a second conductivity type (N) formed in a first region in a major surface of the semiconductor substrate (11) (see fig. 1); a first MOS transistor (37) having the first conductivity type (P) and a first contact region (30) having the second conductivity type (N) formed in the first well (21) (see fig. 1); field oxide regions (13) formed on a surface of the first well (21) (see fig. 1); and a second well (22) (see fig. 1).

However, Applicant's admitted prior art fails to teach the formation of a heavily doped region of buried layer having the second conductivity type. Tsukikawa teaches that it is well known in the art to include a heavily doped region of buried layer (42, 43) having the second conductivity type (N) formed in the first well (33) (e.g. below the source and drain regions (36, 37) of the MOS transistor 39) at a distance away from the first contact region (please note that Tsukikawa does not show the contact region, however, Applicant acknowledges in figure 1 the formation of such a contact region, which is provided outside the MOS region 37) and the field oxide regions (22) (fig. 1), wherein the distance is greater than 0 (see fig. 1, wherein the regions 42 and 43 are formed at a distance away from the isolation regions 22, and the MOS transistor 39), wherein the heavily doped region of buried layer (42, 43) prevents latch-up (see abstract), wherein the heavily doped region of buried layer (42, 43) is not below a field oxide layer (22), and wherein said field oxide layer (22) separates the first well (33) and a second well (32) (see fig. 1).

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Applicant's admitted prior art and Tsukikawa are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to include a heavily doped region of buried layer having the second conductivity type formed in the first well at a distance away from the first contact region and the field oxide regions, wherein the distance is greater than 0, wherein the heavily doped region of buried layer prevents latch-up, wherein the heavily doped region of buried layer is not below a field oxide layer, and wherein said field oxide layer separates the first well and a second well. The motivation for doing so, as is taught by Tsukikawa, is to enhance resistance against soft error or latch-up (Abstract). Therefore, it would have been obvious to combine Tsukikawa with Applicant's admitted prior art to obtain the invention of claims 1 and 39.

***Allowable Subject Matter***

Claims 15, 21, 23-24, 30-32, 34-38, and 40 are allowed.

Claims 13-14, 16-19, 22, 29, and 33 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claims 2-4, 12, and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1 and 39 have been considered but are moot in view of the new ground(s) of rejection. Please note that upon further consideration claim 1 cannot be allowed in view of Tsukikawa (JP 05-129558). Any inconvenience to applicant is sincerely regretted.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Liang et al. (US Pat. No. 6,054,344) discloses the formation of the buried layer 125 separated from the contact region 129 (fig.7); Kim et al. (US Pat. No. 6,274,416 B1) discloses a latch-up preventive layer 42 (see 4); and Yamamoto (JP 05-235290) teaches the formation of buried layers 14, 15 in the wells 5 and 7, respectively (fig. 2).

### ***Correspondence***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (571) 272-1727. The examiner can normally be reached on 9:00-5:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JRD  
2/20/24

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